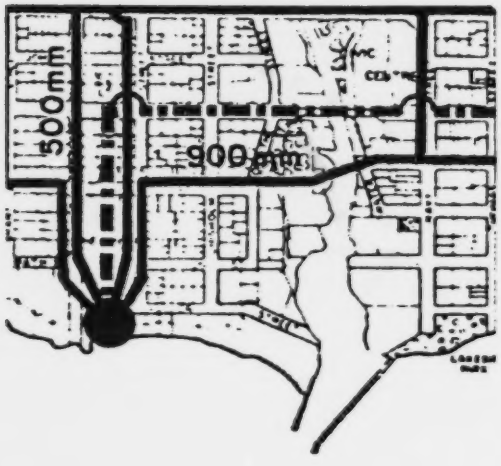
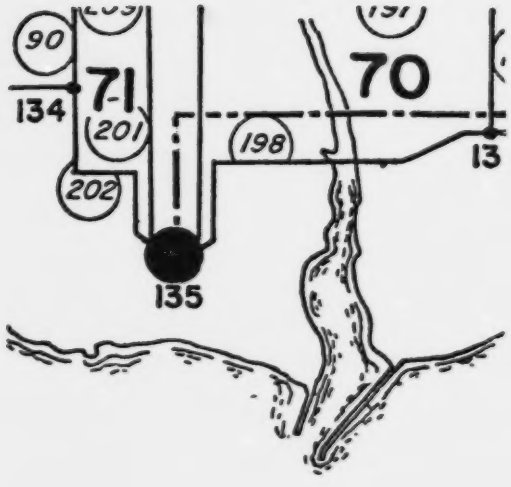
The Regional Municipality of Halton

Town of Oakville



CORE AREA STUDY



Simcoe
Simcoe Engineering Limited
Consulting Engineers

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Regional Municipality of Halton
Public Works Department
2316 South Service Road West
P.O. Box 7000
Oakville, Ontario
L6J 6E1

Attention: Mr. R. W. J. Moore, P. Eng.
Director of Public Works

Dear Mr. Moore:

Re: Core Area Study for the Town of Oakville
Water Distribution System

In accordance with your instructions, we are pleased to submit herewith our report on the results of our Core Area Study. This report is intended to complement and complete our report entitled, "Town of Oakville Water Distribution Study". The major areas considered in this study are summarized as follows:

1. Assessment of the existing distribution system and ultimate requirements within the core area, including all watermains, valves, and hydrants, to determine deficiencies.

2. A review of the fire flow requirements for the Town of Oakville Core Area.

3. A detailed analysis of the existing core area water distribution system to determine the improvements required.

4. A summary of works required and an estimate of costs.

Throughout the preparation of this report, we have received excellent co-operation and assistance from the Region's Public Works Department, as well as assistance from the Region's Planning and Development Department.

It is anticipated that this complete document will be useful as a permanent record for the continued use of the Region's Public Works staff.

Simcoe

We trust that this report will provide the Region with the necessary information for the improvement of the water distribution system within the Town of Oakville Core Area. We will be pleased to discuss this report with you or your staff in detail, or provide any information which might be required.

Yours very truly,

SIMCOE ENGINEERING LIMITED

R. L. Smith, P. Eng.

RLS/jr
Encl.

REGIONAL MUNICIPALITY OF HALTON

OAKVILLE WATER SYSTEM - CORE AREA STUDY

September, 1982

SIMCOE ENGINEERING LIMITED
Consulting Engineers

Pickering, Ontario

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1

Introduction

SECTION 1

INTRODUCTION

1.1 Purpose of the Study

This study complements and completes the study prepared by Simcoe Engineering Limited in 1981 entitled Town of Oakville Water Distribution Study. It deals specifically with the deficiencies and improvements required to the existing water distribution system in the Core Area of the Town of Oakville. The Core Area is defined as being bounded by Maurice Drive to the west, Randal Street to the North, Chartwell Road to the east and Lake Ontario to the south. The existing water distribution study within the Core Area is shown on the enclosed Drawing No. 1.

The Terms of Reference for the Oakville Water Distribution Study are included herein as Appendix 1. Item 5 in the schedule of tasks deals with the Core Area Study.

The general approach to the preparation of this study involved the following:

1. All available information on the water distribution system within the Core Area was examined. This included an inventory of deficient valves and hydrants prepared by the Region of Halton's Maintenance Department.
2. A plan of the existing distribution network within the Core Area was prepared, including all valves, hydrants, and watermains.
3. A land use inventory was taken to prepare a map of existing land use.

4. A schematic plan of the Core Area water distribution network, including all physical pipe data, was prepared to facilitate computer analysis.
5. The Core Area was analyzed by computer under various fire flow conditions to determine weaknesses in the system.
6. Based on the analyses, a plan for the upgrading of the system was prepared, including new or replacement watermains required. The valves and hydrants in need of addition or replacement were also identified. Our recommendations for the correction of existing deficiencies, as well as the future requirements for the Core Area, were then prepared in report form as presented herein.

1.2 Study Area

As discussed with the Regional Municipalty of Halton Public Works and Planning and Development Departments, the study area is as previously stated and is shown on Drawing No. 1. We felt, however, that it was not appropriate to limit the study to only this area. We have also made comments or recommendations that could be applied to the system as a whole or to specific places within the system where deficiencies have been acknowledged.

Population densities, and industrial and commercial developments have been developed, based on the information utilized for the "Master Servicing and Finance Scheme of the Town of Oakville" as prepared by Currie, Cooper, Lybrand Ltd. Specific land use information for the Core Area was obtained by a detailed visual survey of residential, commercial, industrial, and institutional developments within the boundaries of the study area.

1.3 Population and Land Use

The Core Area of Oakville is completely developed; however, redevelopment is an ongoing process and significant re-development may occur in the future. Re-development in the Town Core would most probably be commercial or high density residential in nature.

Re-development projects may affect the findings of this report particularly with respect to the most cost-effective way to replace the older mains within the Core Area. Each application for re-development should be investigated on an individual basis to make sure that sufficient fire flow will be available to the proposed development. If sufficient fire flow is unavailable, then the most cost-effective way of providing that fire flow, and also replacing any mains in a deteriorated state, must be examined.

1.4 Production Rates

In order to define production requirements at various points within the system, it is necessary to develop average day unit production rates for residential, industrial, and commercial developments. The unit production rates used in this study are the same as those developed for the Oakville Water Distribution Study. These unit rates and peaking factors are given in Tables 1 and 2, respectively.

1.5 Method of Analysis

The analysis of the Core Area was achieved by modelling the watermains within the study boundaries and using a computer program to balance flows within the system. All lengths, elevations and "C" coefficients were taken into account. The information gathered with

respect to land use was used to provide consumption data within the Core Area. Consumption for the Town of Oakville outside the Core Area was provided for by including draw-off points on the perimeter of the study area and using flow values obtained from the computer analysis prepared for the Oakville Water Distribution Study. It was apparent from the Oakville Water Distribution Study that normal flow conditions will be satisfactory in the Core Area. This was subsequently confirmed by testing the Core model for the maximum day flow condition. The maximum day plus fire condition was deemed the most onerous condition for analysis.

2

Fire Flow Requirements

SECTION 2

FIRE FLOW REQUIREMENTS

2.1 General

A major requirement of any water distribution system is the provision of adequate quantities of water at appropriate pressure for fire protection. An acceptable supply for the purposes of fighting fires will be reflected in the insurance premiums for the community as a whole. Although it may not always be possible in every respect to satisfy the Insurer's recommendations, the Region should make every feasible effort to do so.

2.2 Necessary Requirements

In evaluating the fire demand for the Oakville Water System, we have taken into consideration the 1977 publication entitled "Guide to Recommended Practice--Water Supply for Municipal Fire Protection" as prepared by Public Fire Protection Survey Services.

This guide indicates the requirements for an adequate and reliable system for fire protection. Included in the criteria are:

a) Supply works

b) Pumping Facilities

c) Buildings and Plant

d) Piping

e) Hydrants

f) Records

TABLE 3

TOWN OF OAKVILLE CORE AREA

SUMMARY OF FIRE FLOW REQUIREMENTS

Location	Development	REQUIRED FLOW igpm	REQUIRED FLOW m^3/d
Rebecca Street & Kerr Street	Institutional	2900	19,000
Lakeshore Road & George Street	Commercial	3500	22,900

TABLE 4

SUMMARY OF FIRE FLOW SIMULATIONS PERFORMED

Location	Schematic Node #	Development	REQUIRED FLOW igpm	REQUIRED FLOW m^3/d
Brookfield Road & Burnet Street	79	Residential	1200	7,854
Wilson Street & Rebecca Street	66	Institutional	3000	19,636
George Street & Randal Street	37	Commercial	3000	19,636
Reynolds Street & King Street	25	Institutional	1200	7,854
Lakeshore Road & Howard Avenue	7	Residential	600	3,927

Specific fire flow requirements have been outlined in a Fire Flow Study for the Town of Oakville carried out in April 1978 by the Public Fire Protection Survey Services of the Insurers' Advisory Organization. The findings of this study and a previous study by Canadian Underwriters' Association dated April 1968, have been included in Appendix 2.

The study had established the fire flow requirements for twenty-nine locations in various parts of the Town. The two locations that were within the boundaries of the Core Area are summarized in Table 3.

For the purpose of simulation using the computer model, five estimates of fire flow requirements were prepared for various locations in the Core Area. These have been summarized in Table 4. The locations for these tests were chosen on the basis of being representative of fire emergencies in the Core Area, where a deficiency was suspected.

2.3 Pressure Requirements

In general, there are two levels of pressure required for fire protection. Pumper trucks must be capable of delivering water from hydrants to potential fire locations. It is generally accepted as recommended by the Insurer's Advisory Organization that delivery pressures from hydrants of less than 140 kPa (20 psi) are unsuitable. Analyses are performed to ensure that fire flows can be delivered to at least this minimum pressure, and improvements to the system are made to achieve the objective.

TABLE 5

WATERMAIN AND HYDRANT REQUIREMENTS RECOMMENDED BY THE PUBLIC PROTECTION SURVEY SERVICES

ARTERIAL SYSTEM. In connection with the supply mains, arteries and secondary feeders should be of sufficient size, considering their length and the character of the sections served, to deliver fire flow and consumption demands to all areas; they shall be properly spaced (about every 3,000 feet) and looped; practical dependence of relatively large sections on single mains constitutes a weakness.

GRIDIRON. The gridiron of minor distributors supplying residential districts should consist of mains at least 6-inch in size arranged so that the lengths on the long sides of blocks between intersecting mains do not exceed 600 feet. Where longer lengths of 6-inch pipe are necessary, 8-inch or larger intersecting mains should be used. Where initial pressures are unusually high, a satisfactory gridiron may be obtained with longer lengths of 6-inch pipe between intersecting mains.

In new construction, 8-inch pipe should be used where dead ends and poor gridironing are likely to exist for a considerable period or where the layout of the streets and the topography are not well adapted to the above arrangement. Both ability to meet the required fire flows and reliability of supply by alternate routing must be considered.

VALVES: LOCATION AND SPACING. The distribution system should be equipped with a sufficient number of valves so located that no single case of accident, breakage, or repair to the pipe system, exclusive of arteries, will necessitate the shut-down of a length of pipe greater than 500 feet in high-value districts or greater than 800 feet in other sections.

HYDRANTS: SIZE AND INSTALLATION. Hydrants should be able to deliver 500 gpm with a friction loss of not more than 1 1/2 psi in the hydrant and a total loss of not more than 5 psi between the street main and outlets. They require at least two outlets, including a larger pumper outlet in areas having required fire flows over 1000 g.p.m. Hydrants shall be of such design that when the barrel is broken off, the hydrant will remain closed. Street connection should be not less than 6 inches in diameter.

A gate valve is necessary on all connnections between hydrants and street mains.

In addition, certain industries and commercial establishments will have sprinkler systems installed. In general, there are two types of sprinkler systems; wet systems and dry systems. Dry systems normally require around 420 kPa (60 psi) in order that they can operate satisfactorily. Wet systems can operate at pressures considerably lower. In most instances this pressure can be as low as 275 kPa (40 psi).

2.4 Local Watermains

With respect to local watermains for fire protection, we have reproduced sections from the Fire Protection Survey Services Water Supply Municipal Guide and included them in Table 5. In essence this guide recommends that in residential districts all watermains should be at least 150 mm (6-inch) in diameter and arranged so that lengths do not exceed 180 m (600 ft.). This approach should be adopted for all new construction. In addition, in any existing areas where other work is anticipated, every effort should be made to improve systems to meet these criteria.

2.5 Hydrant Distribution

It is generally accepted that a hydrant can deliver water at the rate of about 40 L/s (500 Igpm) to 80 L/s (1000 Igpm). In order to provide adequate quantities of water, especially in areas where high fire flows are required, the hydrant distribution must be such that there are enough available for fire fighting purposes. Good practice calls for hydrants to be located at intersections, in the middle of long blocks and near the ends of dead end streets. In high risk industrial areas it is especially important to ensure that

TABLE 6

STANDARD HYDRANT DISTRIBUTION

Fire Flow Required gpm	Average Area per Hydrant ft^2
800 or less	160,000
1,200	150,000
1,700	140,000
2,000	130,000
2,500	120,000
3,000	110,000
3,300	100,000
3,700	95,000
5,200	90,000
4,600	85,000
5,000	80,000
5,400	75,000
5,800	70,000
6,200	65,000
6,700	60,000
7,000	57,500
7,500	55,000
8,300	50,000
9,200	45,000
10,000	40,000

Region Criteria

Industrial - Hydrants not more than 100 metres separation
Residential - Hydrants not more than 150 metres separation

the hydrant distribution is adequate. Table 6 summarizes the necessary hydrant requirements as recommended by the Fire Protection Survey Services.

2.6 Specific Fire Tests Performed

The computer printouts of the five fire flow analyses performed are included in Appendix 4. The results of each analysis are discussed individually below.

Prior to performing these runs, several connections between the trunk feedermains and local distribution watermains were made in the model. This was done as it was felt that it would be impossible to meet the required fireflows at three, or possibly four, of the chosen sites if these connections were not made. The locations for these connections were preliminary and subject to the results of the analysis. The Network Schematic, Drawing No. 2, can be referenced for the locations of these connections.

- Brookfield Road and Burnett Street

  This location is near a residential townhouse development that would require a fire flow in the order of 7850 m^3/d (1200 Igpm). It is also located at the junction of a poorly looped 150 mm diameter watermain and a long 150 mm dead end main feeding a residential district outside the study area. The computer analysis indicated a severe deficiency at this location. The required fire flow was unobtainable.

- Wilson Street and Rebecca Street

  This is the site of a school requiring a fire flow of approximately 19600 m^3/day (3000 Igpm). There is a 500 mm feedermain

running in front of the site but there are no hydrant connections to it nor are the local watermains connected to it. The required fireflow was reached at a suitable pressure although there were severe head losses in some of the local watermains. The most severe losses were incurred in the old 150 mm cast iron watermains which make up a substantial portion of the Core Area supply network.

- George Street and Randall Street

  This test site is located on the northern edge of the downtown commercial area. Typically fireflow requirements for such an area would be 19600 m^3/day (3000 Igpm). The analysis indicated that such a requirement could be met, but again there were severe losses in the old cast iron watermains that predominate in the Core Area. High friction losses were incurred not only in the 100 mm mains but also in the 300 mm main on Randal Street.

- Reynolds Street and King Street

  This test site is in a residential neighborhood. Specifically a school and a church are located at the intersection. An analysis was performed using a 7850 m^3/day (1200 Igpm) fire flow. This rate of flow was achieved at a suitable pressure, however, the losses were very high.

- Lakeshore Road East and Howard Avenue

  This test was performed to indicate the amount of water available to the 100 mm mains south of Lakeshore Road in this area. No problems were experienced with providing the 3900 m^3/day (600 Igpm) fire flow required for the area. It would be impossible, however, to achieve this fire flow from the 100 mm mains on Park and Howard Avenue.

3

Existing System

SECTION 3

EXISTING SYSTEM

3.1 General

The Oakville water distribution system is divided into several separate pressure zones, as a result of the gradual increase in ground elevation from the shore of Lake Ontario to the northern extremeties of the Town. Water must be progressively pumped to the higher elevation pressure zones. These pressure zones are necessary as delivery pressure in any zone must be maintained at between 275 KPa (40 psi) and 700 kPa (101.5 psi).

The Core Area is located within Zone 1 and consequently the watermains within the Core Area have a two-fold purpose. Water must be both made available for domestic, commercial, industrial, and fire fighting purposes within the Core Area, and these mains must transmit water to the succeeding pressure zones above, for the same purposes. These functions are accomplished by a system of trunk feedermains, local feedermains and local watermains. The primary purpose of trunk feedermains is to supply a high volume of water from a source to succeeding pressure zones, or over long distances within the same zone, with a minimum of head loss. They should also supply water to the zone through which they pass at suitable intervals if the pressures are compatible. Such connections reinforce the network and supply water in cases of emergency. Local feedermains (approximately 300 mm in diameter) supply water to the local watermains. They make up part of the local gridiron and are present to supply water over

greater distances than the local watermains would be capable of doing, without severe head losses.

Much of the Core Area distribution system was constructed 60 to 70 years ago. At that time, the service Area was much smaller and the water supply network was sized accordingly. As the subsequent pressure zones were developed and the Zone 1 system was expanded both parallel to and north of Lake Ontario, new trunk feedermains were constructed through the Core Area. As a result, there is not a substantial number of connections between the watermains in the Core Area and the trunk feedermains. The pattern of growth in the Town has also left the Core Area with the oldest watermains.

In this section the deficiencies will be discussed in a general manner. The methods recommended to alleviate the deficiencies will be discussed in a subsequent section.

3.2 Connection Deficiencies

The combination of two events has caused a deficiency in available fire flow in the Core Area. These are the increasing age and thus, tuberculation of the cast iron watermains in the Core Area, and the lack of connections made to the trunk feedermains constructed to supply the other areas of the Town. The infrequent connections limit the availability of fire flow to the older mains which, being highly tuberculated, are incapable of operating at the original design level. This condition can be partially corrected by the addition of several connections between the local mains and the trunk feedermains, throughout the Core Area.

Under emergency conditions, (i.e. fire) this should increase pressure at the fire location by reducing the head losses incurred. Under normal operating conditions there should not be any increased pressure in the local watermains.

3.3 Watermain Deficiencies

The local distribution mains in the Core Area are presently inadequate. Many are old 100 mm diameter cast iron pipes. Most of the remainder are 150 mm cast iron mains about 50 years old. Discussions with the Maintenance Division of the Region's Public Works Department have indicated that the condition of these watermains is apparently so poor that many of the restraint joints have rusted away and the mains are remaining intact only by virtue of the soil reaction. Their highly tuberculated state reduces the amount of water that can pass through them thereby substantially affecting fire fighting capabilities in these areas. The Region has a policy of replacing any 100 mm watermains when any road reconstruction is performed.

3.4 Valve Deficiencies

It has been indicated both by the Maintenance Division of the Region's Public Works Department, and by the performance of fire flow testing that many of the valves in the Core Area are either broken or are inoperable through seizure. In addition, some valves leak when opened and have been closed to prevent this occurrence. In all known cases, these valves are very old and have generally deteriorated along with the mains they are controlling. The known deficient valves have been indicated on Drawing No. 2.

3.5 Hydrant Deficiencies

The principal deficiency with the hydrants in the Core Area is the lack of secondary gate valves on over 50 per cent of the hydrants. There is also a deficiency in their distribution in the Brookfield Road/Brookfield Crescent Area and on Park Road. These deficiencies are indicated on Drawing No. 2.

4

Recommendations

SECTION 4

RECOMMENDATIONS

4.1 General

This section of the report will address corrective measures to resolve the deficiencies discussed in Sections 2 and 3. Appendix 3 contains letters of recommendation that were in response to servicing problems that arose during the course of the study.

4.2 Recommendations Arising from Fire Flow Analyses

The available fire flow in some parts of the Core Area may not be adequate for certain types of land use. Consequently, before any future proposals for redevelopment are allowed to proceed, it will be necessary to ascertain whether sufficient fire flow is available for the proposed redevelopment. The proposals outlined in this section of the report will allow for adequate supplies for the existing development. If the fire flow is not sufficient, for redevelopment, then it should not be permitted without improvements to the water distribution system to assure adequate fire protection.

The Region should implement a program of fire flow testing so that a comprehensive record of flow volumes is available to both the Oakville Fire Department and the Works Department to assist in the approval process for redevelopments. In conjunction with this flow testing, the hydrants should be inspected for general wear and condition. Any deficient hydrants should either be repaired or replaced.

TABLE 7

RECOMMENDED CONNECTIONS BETWEEN
FEEDERMAINS AND THE LOCAL GRIDIRON

Priority	Location	Size of Connection	Estimated Cost ($)
1	Brant Street and Burnet Street	300 mm	20 000
2	Robinson Street and Thomas Street	300 mm	20 000
3	Robinson Street and Dunn Street	300 mm	20 000
4	Church Street and Allan Street	300 mm	20 000
5	Wilson Street and Rebecca Street	300 mm	20 000
6	Brock Street and Rebecca Street	300 mm	20 000
7	Burnet Street and Forsythe Road	300 mm	20 000
8	Wilson Street and Burnet Street	300 mm	20 000

NOTE:

Although these connection points have been given a priority, we recommend that they all be completed within the next two years.

4.3 Connection Requirements

To correct the present deficiencies in available fire flow within the Core Area, we recommend that eight connections be made between the trunk feedermains and local watermains. The location of these connections is summarized in Table 7. These connections have been spaced throughout the Core Area to reduce the hydraulic friction losses incurred under fire flow conditions. Based on the present connection points, losses are presently high due to the size and deteriorated condition of many of the watermains in the Core Area. By reducing the distance water must flow through these mains to a possible fire location, the losses are substantially reduced. We have indicated priority for the connections recommended. Although these connection points have been given a priority, we recommend that they all be completed within the next two years.

We have attempted to locate these connections where they will provide the greatest assistance to the existing network and be compatible with future watermain requirements.

These connection locations have been included on Drawing No. 3.

In addition to the aforementioned connections, consideration should be given to making further connections on the 600 mm feedermain on Rebecca Street between Maurice Drive and the Fourth Line Road, as we believe the connections in this area are inadequate as well.

4.4 Watermain Requirements

A general program of watermain replacement should be

implemented for the Core Area. The Town of Oakville 1980 Road Needs Study recommends reconstruction of many of the Core Area streets, at present or in the near future. It is our recommendation that when these streets are being re-constructed, watermains that are in poor condition be replaced at the same time, thereby reducing the overall cost to the Region. In the interim, we recommend that a number of new watermains be constructed. These watermains are required not only for general replacement, but also for reinforcement of the existing system and for supply of adequate fire flows. Table 8 summarizes the proposed additions and replacement watermains. These watermains are also indicated on Drawing No. 3.

The rational for the need of these watermains is as follows:

- Watermains in the Park Avenue/Carson Lane Area

  These watermains are required to replace the old and undersized watermains that are presently servicing the area. These additional and replacement watermains will improve the available fire flow to the area as well as providing reinforcement to the local network. Funds have been provided for the replacement of these watermains in the current budget.

- Watermains on Second and Union Streets

  The available fire flow would be raised to an acceptable level, and the local watermain network would be adequately reinforced by the replacement of the watermain on Second Street, and the addition of a new 150 mm watermain on Union Street.

TABLE 8

WATERMAIN REQUIREMENTS

LOCATION	YEAR BUDGETED	DIAMETER (mm)	LENGTH (m)	COST ($)	ESTIMATED PRIORITY
Brookfield Road between Burnet St. and Lakeshore Rd.		300	135	46,300	HIGHER
Burnet St. between Brant St. & Brookfield Rd.		300	225	73,400	HIGHER
Carson Lane between Park Ave. and Chartwell Road	1982	200	240	61,200	HIGHER
Church St. between Trafalgar and Reynolds St.		300	110	34,000	LOWER
Church St. at Allan St.		300	25	8,600	HIGHER
Dunn St. between Randal St. & Robinson St.		300	230	71,100	HIGHER
Dunn St. between Randal St. & Trafalgar Rd.	1983	200	175	42,000	LOWER
The Esplanade between Park Ave. & Howard Ave.	1982	150	140	33,600	LOWER
Howard Ave. between The Esplanade & Carson Lane	1982	150	190	45,600	LOWER
Kerr St. from south of Lakeshore Rd. to Rebecca St.		150	150	32,600	LOWER
Lakeshore Rd. East between Park Ave. & Chartwell Dr.	1982	300	230	78,900	HIGHER
*Lakeshore Rd. West between Brookfield Rd. & East of Fourth Ave.		300	1750	600,250	HIGHER
Park Ave. between Lakeshore Rd. & Carson Lane	1982	200	175	42,000	HIGHER
Park Ave. between Carson Lane & The Esplanade	1982	150	190	45,600	LOWER
Reynolds St. between Randal St. & Sumner Ave.		200	115	27,600	HIGHER

TABLE 8 cont'd

LOCATION	YEAR BUDGETED	DIAMETER (mm)	LENGTH (m)	COST ($)	ESTIMATED PRIORITY
Second St. between Lakeshore Rd. and Union St.		200	165	44,600	HIGHER
Second St. south of Union St.		150	135	32,400	LOWER
Sumner Ave. between Trafalgar Rd. & Reynolds St.		200	110	26,400	HIGHER
Thomas St. between Front St. & Robinson St.	1986	250	240	66,700	HIGHER
William St. between Thomas St. & Allan St.	1984-85	150	460	110,400	HIGHER
William St. between Navy St. & Thomas St.	1984-85	200	100	24,000	HIGHER
Trafalgar Rd. between King St. & Lakeshore Rd.		200	240	57,600	HIGHER
Union St. between First St. and Second St.		150	110	23,900	HIGHER

*Note: This watermain is not for the direct benefit of the Core Area.

- Watermains on Burnet Street, Brookfield Road, and Lakeshore Road West

We recommend that the location of the proposed 300 mm diameter watermain along Lakeshore Road West between Brant Street and just east of Fourth Line Road in the Town of Oakville Water Distribution Study be modified. Instead of the connection to the 900 mm feedermain on Brant Street being made at Lakeshore Road, it should be located at Burnet Street. This has two advantages: the first being that construction along Lakeshore Road will be costly and any portion that can be constructed on a less congested roadway will be of benefit; the second advantage is that the Brookfield Road and Brookfield Crescent area is deficient in the amount of fire flow available. This would be the most cost effective way of alleviating this condition, and providing the new watermain to the Lakeshore Road West area.

- Watermain on Thomas Street South of Robinson Street

The intersection of Thomas and Robinson Streets is the site of a proposed connection between the 900 mm feedermain to Davis Road Pumping Station and the local watermain network. In the event of a fire anywhere in the area south of Robinson Street, water must presently travel long distances along small watermains, thereby incurring large head losses. The addition of this 250 mm watermain will alleviate this condition and also reinforce the existing network.

- Watermain on Dunn Street North of Robinson Street

We propose that a 300 mm watermain be constructed on Dunn Street north from the proposed connection to the 900 mm feedermain on

Robinson Street. This watermain will alleviate many of the low hydrant flows experienced in the commercial district. The proposed 200 mm extension of this watermain will also tie into the proposed 200 mm on Sumner Avenue, providing much needed reinforcement to the local system.

- Watermain on Kerr Street

This watermain is required to provide adequate looping and reinforcement of the distribution system in this area.

- Watermain on Reynolds Street and Sumner Avenue

These proposed watermains are a direct result of the need to supply adequate fire flow to an existing nursing home development on the north side of Randal Street between Trafalgar Road and Reynolds Street. They will provide adequate fire flow to the north side of the development as required by the Public Fire Protection Survey Services Guide to Recommended Practice.

- Watermains on Church Street

These two sections of watermain will alleviate the extremely poor hydrant flows experienced at the hydrants at the intersection of Church and Reynolds Streets and on Church Street between Reynolds and Allan Streets. A connection to the 900 mm feedermain on Allan Street will have to be made when the short section at Church and Allan Streets is constructed. These sections of watermain are oversized to 300 mm for reasons discussed under the heading Future Requirements.

- Additional Proposed Watermains

The 1982 budget includes provision for the construction of 125

TABLE 9

ADDITIONAL HYDRANTS REQUIRED

PRIORITY	LOCATION	TIMING	ESTIMATED INSTALLATION COST ($)
1.	Brookfield Crescent and Brock Street	immediate	4,000
2.	First Street between Lakeshore Road and Union Street	immediate	4,000
3.	Rebecca Street and Forsythe Street	immediate	4,000
	Brookfield Road and Burnet Street	upon construction of new 300 mm main at this location	4,000
	Dunn Street between Trafalgar Road and Randal Street	upon construction of new 200 mm main at this location	4,000
	Park Avenue between Lakeshore Road and Carson Lane	upon replacement of the 100 mm watermain with the proposed 200 mm watermain	4,000
	Park Avenue between Carson Lane and The Esplanade	upon replacement of the 100 mm watermain with the proposed 150 mm watermain.	4,000

metres of 150 mm watermain on Burnet Street between Wilson Street and Chisholm Street. This watermain will improve system security.

The 100 mm watermain on William Street has also been slated for replacement. A 150 mm watermain has been proposed for this location by the Public Works Department. We generally concur with this proposal, but suggest that the section between Thomas Street and Navy Street be oversized to 200 mm to increase fire flow to the Oakville Club, located at William Street and Water Street. We also suggest that the proposed 250 mm watermain on Thomas Street be constructed at the same time as the William Street watermain.

4.5 Hydrant Requirements

In keeping with the guidelines on hydrant distribution as recommended by the Public Protection Survey Services there are some areas of the Core Area which are deficient. In addition, approximately half of the hydrants in the Core Area are not equipped with a secondary valve to isolate the hydrant from the street main. These hydrants and the locations for additional hydrants are indicated on Drawing No. 2. We have also identified the hydrants which were originally manufactured by the Kerr Company. The parts for these hydrants are no longer available. Particular care should be taken to ensure that these hydrants are in acceptable operating condition and, if not, their replacement should be immediate.

In the past it has been the practice in some municipalities not to include hydrants on major distribution mains, but only on local mains. There are feedermains in the Town of Oakville, such as the Zone 1 feedermain on Speers Road and on the 500 mm feedermain on

TABLE 10

Deficient valves in order of repair/replacement priority

Priority	Location	Number of deficient Valves at the Location	Estimated Cost of Replacement ($)
1	Chisholm Street & Lakeshore Road	4	13,000
2	Wilson Street & Lakeshore Road	2	7,000
3	Wilson Street & Rebecca Street	1	4,000
4	Randal Street & Allan Street	1	4,000
5	Trafalgar Road & Randall Street	1	4,000
6	Brant Street & Lakeshore Road	1	3,000
7	Anderson Street & Chisholm Street	1	3,500
8	Kerr Street & Lakeshore Road	1	3,000
9	Chartwell Road & Lakeshore Road	1	3,000
10	Forsythe Road near Anderson Street	1	3,000
11	Reynolds Street & Lakeshore Road	1	3,000

NOTE: Although priorities have been shown, this work should be completed within 1 year

Deficient Valves for which repair/replacement will not be priority as new watermains are proposed for these locations.

Lakeshore Road & Howard Avenue	1
Reynolds Street & Randal Street	1
Park Avenue & Carson Lane	1
Park Avenue & The Esplanade	1

Rebecca Street that do not have hydrants located on them. We believe that mains such as these should be provided with hydrants. Hydrants on these mains will provide additional water for fire fighting purposes, especially to areas where the system is weak. It is our recommendation that all future distribution feedermains be equipped with suitably located hydrants.

As watermains are gradually replaced in the Core Area the hydrants lacking secondary valves should be so equipped. Table 9 opposite indicates the locations for additional hydrants that are required and the priority for their installation.

4.6 Valve Requirements

The Region should undertake a survey of all the valves in the Core Area to ensure that they are operating properly. If a valve is not operating properly, or is totally inoperable, it should be scheduled for repair or replacement. This should be undertaken immediately in any areas where there is either a high concentration of deficient valves, or the valves are on watermains 200 mm and larger. The replacement of broken valves on many of the older small watermains can be deferred until such time as the entire watermain is replaced. The valves now known to be deficient and the priorities for repair or replacement are given in Table 10 opposite. It should be noted that not all valves have been recently tested and, as such, it is difficult for us to identify all of the defective valves at this time.

The locations for valves for the proposed addition and replacement watermains should be in keeping with the recommendations

TABLE 11

CONNECTION REQUIREMENTS FOR PROPOSED 900 mm TRUNK FEEDERMAIN TO DAVIS ROAD BOOSTER PUMPING STATION

1. Walker Street and Wilson Street

   - connections to 300 mm main on Wilson Street and 200 mm main on Walker Street

2. Lakeshore Road and Chisholm Street

   - 300 mm connection to existing network

3. Rebecca Street and Chisholm Street

   - connection to existing 500 mm trunk watermain

4. Bond Street and Queen Mary Drive

   - connection to 300 mm diameter main on Queen Mary Drive

5. Queen Mary Drive and Stewart Street

   - connection to 300 mm diameter main on Queen Mary Drive

6. Queen Mary Drive and Riverside Drive

   - connection to 300 mm diameter main on Queen Mary Drive

of the Public Protection Survey Services which in part recommends, "The distribution system should be equipped with a sufficient number of valves so located that no single case of accident, breakage or repair to the pipe system, exclusive of feedermains, will necessitate the shut down of a length of pipe greater than 150 metres in high-value districts or greater than 240 metres in other districts."

4.7 Future Requirements

Due to the built up nature of the Core Area, and general land use patterns, water consumption rates are not expected to change significantly. It is possible that the commercial core may expand to south of Robinson Street and there may be an increase in high density accommodation at some time in the future. The general replacing and upgrading of the watermains in the Core Area to current standards should be able to accommodate this possible future demand.

Future demand in Zones 2 and 3 will require the construction of a 900 mm feedermain from the water purification plant to the Davis Road Booster Pumping Station. This feedermain can be routed across Sixteen Mile Creek below Lakeshore Road along William Street and possibly up Reynolds Street. This route would prove very costly and would not be reinforcing the existing network effectively, as the existing 900 mm feedermain is nearby. The alternative is to construct the new feedermain along Queen Mary Drive and cross Sixteen Mile Creek in the region of Speers Road. This route has the advantage of being less congested and has a shorter crossing of Sixteen Mile Creek. In addition, it would reinforce the area north of Lakeshore Road, which is devoid of large feedermains, and create greater system security.

Table 11 indicates locations at which connections should be made to the existing system. We also recommend that the portion of the proposed feedermain, which is on the site of the water purification plant be constructed in conjuction with the proposed expansion to the high lift pumping station. The remainder, from the intersection of Wilson and Walker Streets to the Davis Road Booster Pumping Station can be constructed when it becomes necessary.

The two sections of watermain we have proposed for Church Street have been oversized to 300 mm for the following reason. The Region has an alternative in the future as to how the gridiron in the commercial district should be replaced. The Region can replace the 300 mm main on Randal Street with a new main of the same size and using smaller mains to fill in the gridiron south of Randal Street when the old mains in this area are eventually replaced. An alternative to this would be to defer the replacement of the 300 mm main on Randal Street and build a new 300 mm watermain on Church Street as a replacement for this main. This may be a better solution as the 100 mm watermain on Church Street is both undersized, and in poor condition, and is in need of replacement in any event. We have not recommended the immediate replacement of the Church Street watermain as this will be an extremely expensive undertaking and we have already recommended the changes to the system which are required to provide adequate fire flow to the Core Area as it now exists.

Appendix 1
Terms of Reference

1980 08 11

THE REGIONAL MUNICIPALITY OF HALTON

TERMS OF REFERENCE

FOR WATER DISTRIBUTION ANALYSIS FOR

THE TOWN OF OAKVILLE

In 1979 the firm of Marshall Macklin Monaghan completed a study on the water distribution system in the Town of Oakville reviewing the existing system and four different development concepts.

The purpose of this study is to analyze the system and make recommendations based on the future development as approved by the Ontario Municipal Board in 1979 and a detailed analysis of the Core Area as identified in the terms of reference.

Base maps for the report will be provided by the Region of Halton.

The consultant should allow for at least four meetings with Regional staff and two meetings with the elected representatives.

The Region of Halton prefers that the computer analysis be carried out using the FLOW Water Distribution Network Analysis through the Multiple Access Computer Group. We recognize that some consultants have their own in-house computer program and may wish to undertake the analysis with the use of that program. Upset limits must be presented, based on both methods of analysis and should be summarized individually for the future development and the Core Area portion. Completion dates for each portion must also be stated. The Region reserves the right to select either method of computer analysis.

SCHEDULE OF TASKS

1. Inventory and Data Collection

   a) Review existing reports
   b) Process consumption records
   c) Pumping station and reservoir inventory
   d) Size, age and type of mains
   e) Population projections
   f) Land use and planning
   g) Review of any operational problems and planned improvements

2. Develop System Demands

   a) Develop average day, maximum day and maximum hour rates/ hectare for existing and future conditions and areas to be developed for each zone.

   b) Review with Insurers Advisory Organization and develop fire flow requirements.

   c) Determine demand conditions for each pressure zone.

3. Evaluate Overall Distribution System (To year 2001)

   a) Review hydraulic control levels for pressure zones.
   b) Review physical zone boundaries.
   c) Develop interconnections between zone boundaries and Region of Peel and City of Burlington water systems.
   d) Determine location and size of pumping requirements for each zone.
   e) Determine location and size of storage requirements for each zone.
   f) Make recommendations on system operation.
   g) Review role and development of water purification plant.

4. Examine Individual Pressure Zones

   a) Develop hydraulic models for each zone.
   b) Test zones for different consumption rates * on maximum day including:
      (1) Residential (Max. Hour Evening)
      (2) Industrial (Max. Hour During Day)
      (3) Minimum Hour (night-time reservoir filling)
      (4) Maximum Day (plus fire flow)
   c) Validate model by field testing (minimum 6)
   d) Determine necessary improvements and propose remedial measures.

* Three conditions to be considered: i) Interim (1st - 5 yrs.)
ii) Ultimate (2001)
iii) Existing (1980)

5. Examine Deficiencies in Core Area of Oakville

   a) Accumulate all pertinent data from Region Maintenance and Operations Division and local Fire Department for area bounded by Maurice Drive, Chartwell Road, Lake Ontario and Randall Street.

   b) Collect data from local and Regional Planning Department for future growth and re-development.

   c) Detailed analysis of area for all watermains (100 mm and above) and make recommendations including cost estimates and priority for improvements.

6. Prepare Final Report and Master Plan

   a) Draft report (10) to be submitted to Regional staff for review and comment.

   b) Twenty-five (25) copies of Final Report required.

   c) Six (6) copies of the Computer Output required.

Appendix 2

Information on Fire Flows

Public Fire Protection Survey Services

Technical surveys for underwriters and municipalities

c/o Insurers' Advisory Organization
180 Dundas Street West, Toronto
Ontario M5G 1Z9 (416) 597-1200

25 April 1978

Marshall Macklin Monaghan,
275 Duncan Mill Road,
Don Mills, Ontario
M5G 1Z9

Attention: Mr. Benson Leung, P. Eng.

Dear Sir:

Fire Flow Requirements Study -
Town of Oakville

In reply to the request of The Regional Municipality of Halton, the Town of Oakville was visited in order to determine basic fire flow requirements.

The basic fire flow requirement is the rate and duration of supply for fire demand to confine and control the fires possible in a building or group of buildings, but not necessarily the most severe situation which may be an anomally in the community. The basic fire flow is used for our purposes as an underwriting yardstick to measure the basic fire potential against the water supply and fire department capabilities available in the municipality.

These fire flow requirements are provided on an advisory basis on your request and should be helpful when reviewed in combination with more specific studies of local needs by consultants, staff, or local task forces in arriving at fire protection decisions based upon an analysis of local priorities and financial capabilities.

The basic fire flow requirement is 3500 Imperial g.p.m. for 3.7 hours. In addition, the following is a list of required fire flows for various types of occupancies and constructions within the City limits:

cont'd...

Financed and directed by

Insurance Bureau of Canada
Bureau d'assurance du Canada

1. White Oaks Blvd. at Marlborough Cresc.

Residential high rise apartment buildings, ground floor area of approximately 24,000 square feet. Construction taken as fire resistive, 15 storeys high. Light exposure from adjacent commercial. Fire flow required:
2000 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

2. Trafalgar Road, Sheridan College

Institutional, ground floor area of approximately 139,000 square feet. Construction taken as fire resistive, one, two and three storeys high. Occupancy credit. Fire flow required:
3500 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

3. Leighland Road & Trafalgar Road

Commercial, ground floor area of approximately 107,700 square feet. Construction taken as non-combustible, one = two storeys high. Credit for automatic sprinkler system. Fire Flow required:
2400 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

4. Sinclair Road & South Service Road

Industrial, ordinary hazard, ground floor area approximately 82,400 square feet, one = three storeys high. Credit for automatic sprinkler system. Light exposure from adjacent building. Fire flow required:
2500 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

5. Wyecroft Road near South Service Road

Industrial, light hazard, ground floor area approximately 111,000 square feet. Construction taken as non-combustible, one = two storeys high. Credit for automatic sprinkler system. Fire flow required:
2400 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

6. Speers Road & Woody Road

Commercial-Industrial plaza, ground floor area approximately 55,110 square feet. Construction taken as non-combustible, two storeys high. Credit for automatic sprinkler system. Fire flow required:
2600 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

cont'd...

7. Speers Road & Third Line Road

Industrial, ground floor area approximately 26,000 square feet, construction taken as ordinary, one and two storeys high. Credit for automatic sprinkler system. Moderate exposure from adjacent buildings. Fire flow required:
2000 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

8. The Canadian Road

Industrial, large industrial plant, construction taken as non-combustible, one equals two storeys high. Credit for automatic sprinkler system. Fire flow required:
3500 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

9. Speers Road, east of Bronte Road

Industrial, ordinary hazard, ground floor area approximately 54,000 square feet. Construction taken as non-combustible, one, two and three storeys high. Credit for automatic sprinkler system. Fire flow required:
2400 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

10. McCraney Street & Montclair Drive

Institutional, ground floor area approximately 62,270 square feet, construction taken as fire resistive, one, one equals two and three storeys high. Occupancy credit given. Light to moderate exposures by adjacent wings of school. Fire flow required:
2200 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

11. Sixth Line & Elm Road

Residential townhouses, varying ground floor areas, construction taken as ordinary, two storeys high. Fire flow required:
1200 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

12. Falgarwood Drive at Eighth Line Road

Residential townhouses, varying ground floor areas, construction taken as ordinary, four storeys high. Fire flow required:
2000 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

cont'd...

13. Iroquois Shore Road & North Service Road

Industrial, extra hazard, ground floor area approximately 69,000 square feet. Construction taken as non-combustible, one equals two storeys high. Credit for automatic sprinkler system. Fire flow required:
2400 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

14. Lyons Lane & Cross Avenue

Commercial, modern shopping plaza, ground floor area approximately 37,000 square feet. Construction taken as non-combustible, one and two storeys high. Light to moderate exposures from adjacent buildings. Fire flow required:
2600 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

15. Lakeshore Road & Suffolk Drive

Institutional, ground floor area approximately 12,750 square feet. Construction taken as ordinary, one equals two storeys high. Occupancy credit, light to moderate exposures from adjacent buildings. Fire flow required:
1500 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

16. Rebecca Street & Lees Lane

Institutional, ground floor area approximately 86,100 square feet. Construction taken as fire resistive, two storey and one equals two storey high, occupancy credit. Fire flow required:
2300 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

17. Fourth Line Road & Speers Road

Institutional, ground floor area approximately 32,700 square feet. Construction taken as fire resistive, one and one equals two storeys high. Occupancy credit, light exposure from adjacent portables. Fire flow required:
1400 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

18. Rebecca Street at Margaret Drive

Institutional, ground floor area approximately 53,200 square feet. Construction taken as fire resistive, one equal two and two storeys high. Occupancy credit, light exposure from adjoining building. Fire flow required:
1900 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

cont'd...

19. Lakeshore Road & George Street

Commercial - P.M.D., ground floor area approximately 50,850 square feet, construction taken as ordinary with minor amount of wood frame, two and three storeys high. Light to moderate exposure from adjacent buildings. Fire flow required: 3500 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

20. Rebecca Street & Mississauga Street

Large petroleum industrial properties having substantial measure of private water supply protection. In view of possible exposure to the community in the event of a major fire and future development that may occur in this area, consideration should be given to providing a commensurate supply of water to protect the type of light industrial plant that may be constructed in this zone.

21. Rebecca Street & Seabourne Drive

Commercial, modern shopping mall, ground floor area approximately 85,200 square feet. Construction taken as non-combustible, one = two storeys high. Fire flow required:
3300 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

22. East Street at Marine Drive

Residential high rise apartment buildings, ground floor area approximately 11,000 square feet. Construction taken as fire resistive, 15 storeys high. Fire flow required:
1200 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

23. Hixon Street & Vance Drive

Institutional, ground floor area approximately 61,350 square feet. Construction taken as non-combustible, one storey and one equals two storeys high. Occupancy credit given. Fire flow required:
2500 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

24. Third Line Road & Venetia Drive

Institutional, ground floor area approximately 24,000 square feet. Construction taken as ordinary and non-combustible, one and two storeys high. Occupancy credit given. Light to moderate exposures from nearby portables. Fire flow required:
2000 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

cont'd...

25. Rebecca Street & Kerr Street

Institutional, ground floor area approximately 17,600 square feet, construction taken as wood frame, one equals one and a half storeys high. Fire flow required:
2900 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

26. Lakeshore Road East & Ennisclare Drive

Residential, varying ground floor areas, construction taken as ordinary and wood frame. Fire flow required:
800 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

27. Ninth Line Road & Constance Drive

Commercial, ground floor area approximately 30,000 square feet. Construction taken as non-combustible, one equals one and a half storeys high. Fire flow required:
2000 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

28. South Service Road, east of Trafalgar Road

Industrial, ground floor area approximately 184,700 square feet. Construction taken as ordinary and non-combustible, one and two storeys high. Moderate exposures from adjoining buildings. Credit for automatic sprinkler system. Fire flow required:
4200 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

29. MacDonald Road & Reynolds Road

Institutional, ground floor area taken approximately 25,100 square feet. Construction taken as fire resistive, four and five storeys high. Moderate exposure from adjacent wing of hospital. Occupancy credit. Fire flow required:
2200 Imperial g.p.m. at 20 p.s.i.g. residual hydrant pressure.

I trust this information will be useful to you in your studies. If you have any questions concerning the flows, please do not hesitate to contact us.

Yours truly,

D. F. Cowie,
Surveyor, Ontario Region

DFC:wjb
c.c. The Regional Municipality of Halton,
Public Works Department,
3027 Harvester Road, Burlington, Ontario L7N 3G8
Attention: Mr. E.B. Robertshaw, C.E.T., Engineering, Planning & Development

CANADIAN UNDERWRITERS' ASSOCIATION

PROVINCE OF ONTARIO BRANCH

TORONTO, 1

REPORT ON THE

TOWN OF OAKVILLE, ONT.

MUNICIPAL FIRE PROTECTION DIVISION — APRIL, 19 6

SUMMARY OF CONDITIONS

N. B. - "The term Standard refers to the basis of evaluation used for underwriting procedures".

General - Population 54,733. An incorporated town on the north shore of Lake Ontario about 23 miles southwest of the City of Toronto. The area of the town was increased from 1.75 to 104 square miles by annexation in 1962. Topography in the southern part of the town which includes the water protected area is generally level; however there is a gradual increase in elevation from Lake Ontario to the northern boundary of the town. Winter temperatures are moderate and snowfall is not heavy. Industries are quite diversified and include a large automobile manufacturing plant and several petroleum distillery plants.

Water Supply - Water works and distribution system owned by the municipality and operated by the Oakville Public Utili Commission under capable management. Records and plans complete with storage in metal cabinets. Source of supply Lake Ontario, abundant with intakes in duplicate. Available low lift and high lift pumping capacities in connection w storage Standard. Pumping all by electric power with considerable flexibility of power supply. Duplicate supply mains the principal mercantile district. Fifty percent of fire flows were below Standard requirements and 27% were more than 50% deficient. Arterial system improved but weak in outlying areas. Hydrants serve all built up areas in the southern part of the town and distribution is fairly good. PRINCIPAL DEFICIENCIES ARE INSUFFICIENT PUMPING CAPACITY BY ALTERNATIVE FORM OF POWER AND LACK OF LOOPED ARTERIAL FEEDERS IN OUTLYING AREAS.

Fire Department - Combined full time and large volunteer department under rather good administration and operating efficiency, but additional full time men are required. An additional pumper company and ladder company are require Apparatus of modern type and in good condition. Pumper capacity in excess of Standard requirement. Equipment genera complete and well maintained. Training rather good but suitable training facilities are lacking. Response to alarms prompt and Standard in apparatus, but considerably below Standard in daytime manpower response. Running distances t some rural areas in excess of Standard. One fire station poorly located. Fire methods fairly good. PRINCIPAL DEFIC- IENCIES ARE INSUFFICIENT FULL TIME FIREFIGHTERS AND ONE POORLY LOCATED FIRE STATION.

Fire Alarm - No municipal fire alarm system. Alarms transmitted by telephone to continuously manned fire alarm cent at headquarters fire station. Public telephone coverage fairly good. Radio and telephone facilities good and includes voice recording. PRINCIPAL DEFICIENCY LACK OF STANDARD MUNICIPAL ALARM SYSTEM.

Fire Prevention - Bureau consists of a chief fire prevention officer and a fire inspector; additional staff required to carr out an adequate inspection and educational program. New comprehensive by-law under consideration. Local conditions good to fair with good records maintained.

Building Regulations - National Building Code of Canada enacted, except Part 7, and by-law for fire limits retained, b limits should be extended. Sufficient staff to carry out a good inspection program.

Structural Conditions - Principal mercantile district comprises mainly one and two storey buildings with about 56% mason 27% fire resistive and 17% frame construction. Exposures are moderate. Industrial areas generally without congestion. Construction in residential areas predominantly brick veneer and frame, but wood shingles are not noticeable. CONFLAG- RATION HAZARD REGARDED AS LIGHT TO MODERATE THROUGHOUT THE TOWN.

IMPORTANT CHANGES SINCE LAST INSPECTION

Area of town increased from 1.75 to 104 square miles by annexation. A duplicate intake 72" in diameter is under const ruction. Low lift pumping capacity increased 300% and high lift pumping capacity increased 20%. Surface storage on high ground increased 400%. A number of large arterial mains installed. A new headquarters fire station provided and the two former township fire stations are operated. Three new pumpers and a quadruple combination purchased. Brigade strength increased from 91 volunteer fire fighters to 33 full time and 72 volunteer fire fighters. Telegraph fire alarm system removed. All vehicles radio equipped. Fire prevention bureau established.

CANADIAN UNDERWRITERS' ASSOCIATION
ONTARIO BRANCH

TOWN OF OAKVILLE, ONTARIO

MUNICIPAL FIRE PROTECTION DIVISION — APRIL, 1968

RECOMMENDATIONS

"The following recommendations are designed to aid municipal officials in planning improvements in fire protection, and lead towards Standard protection for underwriting purposes. (Recommendations in capital letters are of particular importance and their early adoption is urged.)" It is recommended:

Water Supply

1. That arrangements be made for a service truck equipped with the necessary tools and record books to respond with water works employees to all alarms of fire in the principal mercantile and industrial districts, and to second alarms elsewhere, to assist is making the most effective use of water supplies.

2. THAT THE HIGH LIFT PUMPING CAPACITY BE INCREASED SO THAT THE SYSTEM, WITH THE TWO MOST IMPORTANT PUMPS OUT OF SERVICE, COULD DELIVER IN CONJUNCTION WITH STORAGE THE MAXIMUM DAILY CONSUMPTION FOR A PERIOD OF FIVE DAYS COINCIDENT WITH REQUIRED FIRE FLOW OF 3,200 GPM FOR 10 HOURS.

3. Auxiliary power for pumping should be provided so that in the event of electrical interruption, maximum daily consumption for two days coincident with required fire flow for ten hours may be met.

4. THAT THE GRIDIRON SYSTEM OF LARGE ARTERIAL MAINS BE SUITABLY STRENGTHENED TO DELIVER MORE ADEQUATE SUPPLIES TO THOSE AREAS WHERE FIRE FLOW TESTS DISCLOSE WEAKNESSES IN THE SYSTEM, BY EXTENDING TO AREAS NOT SUPPLIED BY LARGE MAINS AND FORMING COMPLETE LOOPS.

5. THAT THE LOOPING OF MAIN LATERALS AND DEAD END MAINS BE CARRIED OUT AS RAPIDLY AS POSSIBLE, ESPECIALLY IN AREAS WHERE THERE ARE SINGLE FEEDS OF EXCESSIVE LENGTH.

6. That the following be adopted as a standard minimum size of mains used for hydrant supply for all future installations:

(a) In residential districts 8-inch; 6-inch to be used only where it completes a good gridiron and in no case in blocks 600 feet or more in length.

(b) In mercantile and manufacturing districts 8-inch and 12-inch mains, the former to be used only in completing a good gridiron, the latter for long lines not cross-connected.

80 12 02
RR 108.27

Mr. D. F. Cowie,
Surveyor,
Ontario Region,
Public Fire Protection Survey Services,
c/o Insurers Advisory Organization,
180 Dundas Street West,
Toronto, Ontario.
M5G 1Z9

Dear Mr. Cowie:

Re: Fireflow Requirements for the
Town of Oakville

Simcoe Engineering Limited have recently been retained by the Regional Municipality of Halton to undertake an updated study of the water system requirements for the Town of Oakville.

Although information was obtained from you on April 25th, 1978, a copy of which is attached hereto, we would request at this time that you might indicate directly to Simcoe Engineering any additions or revisions that might be appropriate for the study which they are undertaking. Mr. R. L. Smith of Simcoe Engineering Limited will be contacting you shortly in order to discuss with you various items of consideration.

We wish to thank you in advance for your assistance on this matter and we will forward to you a copy of the report when it becomes available.

Yours very truly,

REGIONAL MUNICIPALITY OF HALTON

E. B. Robertshaw, C.E.T.

Encl.

Appendix 3
Letters of Recommendation

82 01 12
108.27

Regional Municipality of Halton,
Works Department,
1151 Bronte Road,
P.O. Box 7000,
Oakville, Ontario.
L6J 6E1

Attention: Mr. J. Nickerson, C.E.T.

Dear Sir:

Re: Fire Protection of Proposed Nursing Home
between Trafalgar Road and Reynolds Street
on Randal Street

We have investigated the need for increased flows in the area for adequate fire protection of the proposed nursing home and present the following comments.

The fire flow requirements for the proposed nursing home will be based on a number of factors; the most important of which are the type of construction and whether or not sprinklers are to be installed. The fire flows we have calculated for different conditions are as follows:

1. Wood frame construction (structure essentially all combustible), no sprinklers installed = 3880 igpm

2. Wood frame construction, with sprinklers installed = 2824 igpm

3. Ordinary construction (brick or masonry wall, combustible interior) no sprinklers installed = 2590 igpm

4. Ordinary construction, with sprinklers installed = 1883 igpm

The hydrant flow tests of July 28 and 30, 1981 indicated that the amount of fire flow available is approximately 900 igpm at 20 psi. It would appear that this supply is available for the 300 mm diameter main on Randal Street via the 750 mm diameter trunk feeder on Navy Street. It should be possible

.../2

to obtain an equal amount of water along this 300 mm dia. main from the opposite direction if a connection is made between this main and the 900 mm dia. trunk feeder on Allan St. This total amount of fire flow still falls short of the required flow. The amount of flow could be dramatically increased however if the section of 300 mm dia. watermain from Trafalgar Road to Allan St. is either cleaned or replaced at the same time the connection to the 900 mm dia. trunk feeder is made. From the hydrant flow tests it appears that the 300 mm dia. main on Randal St. is equivalent to a 200 mm dia. main with a C of 80. Upon cleaning or replacement we estimate that 2200 Igpm would be made available in addition to the 900 Igpm already present.

We recommend that sections be taken from the 300 mm dia. watermain on Randal and that the possibility of cleaning or replacement be investigated for the entire length from Navy St. St. to Allan St. in light of the deficiencies in the rest of the downtown core area.

Provision will also have to be made to increase fire flows to the rear of the nursing home along Sumner St. We recommend that a 200 mm dia. main be looped up Reynolds St. and along Sumner Avenue from Randal St. to Trafalgar Road with a connection to the existing network at Sumner Avenue and Reynolds St. New hydrants should be installed on this 200 mm dia. main and the cleaned or replaced 300 mm dia. main on Randal St. at intervals of no more than 50 metres as shown on the attached drawing.

The minimum improvements that we would recommend are shown on the attached sketch.

We hope the above meets with your approval. If you have any comments or questions please do not hesitate to call.

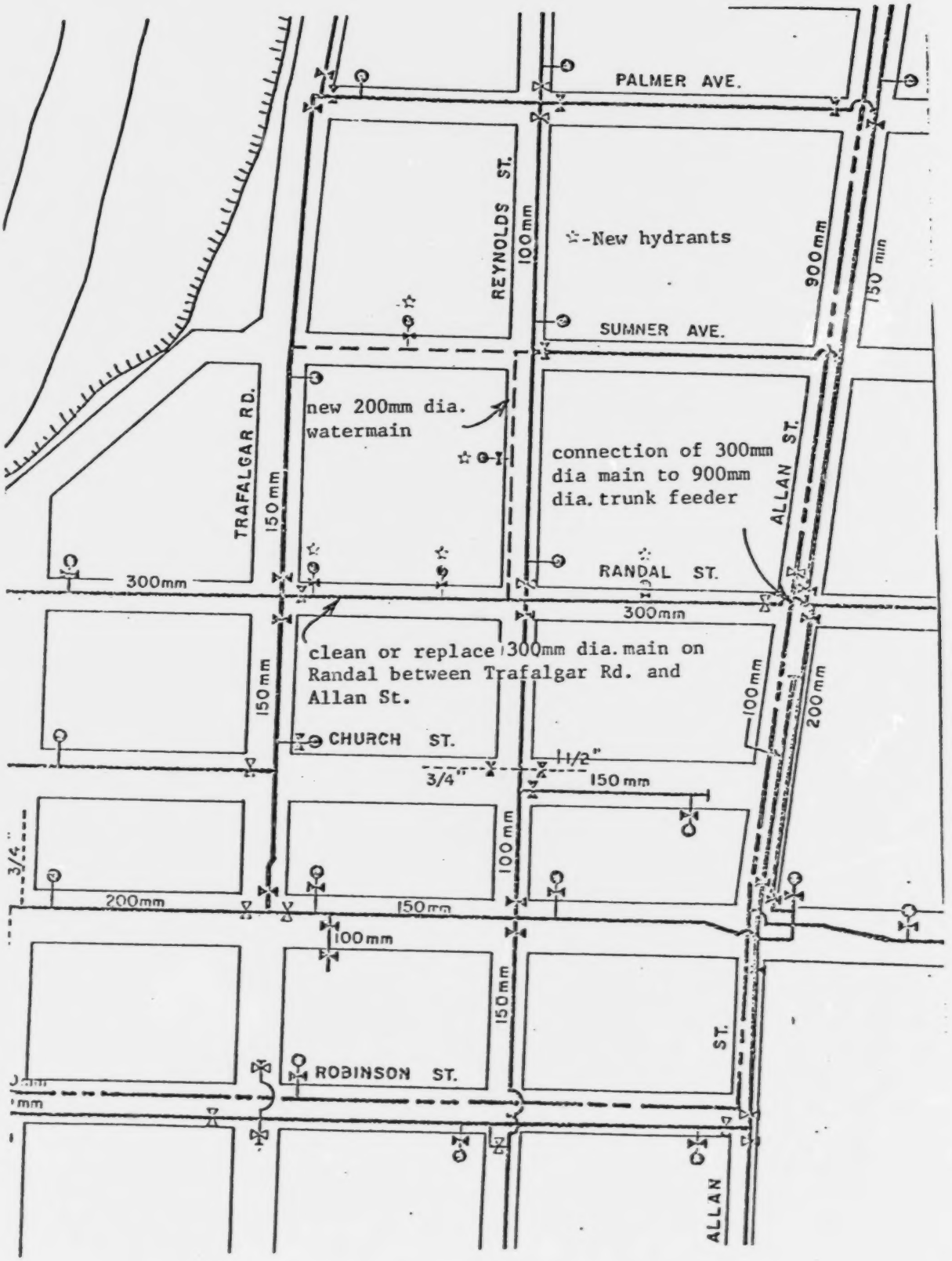
Yours very truly,

SIMCOE ENGINEERING LIMITED

R. L. Smith, P. Eng.

RLS/st
Encl.

Minimum system improvement required



82 03 17
RR 108.27

Regional Municipality of Halton
1151 Bronte Road
P.O. Box 7000
Oakville, Ontario
L6J 6E1

Attention: Mr. G. Nickerson,
Public Works Department

Dear Sirs:

Re: Fireflow tests of March 16, 1982 and Watermain Requirements for the Proposed Randal Street Nursing Home

We have analyzed the data obtained from the hydrant testing performed on March 16, 1982, and have reached the following conclusions:

1. The amount of water available from the 300 mm main on Randal St. is much greater than originally believed. The results of the fireflow testing of March 16, 1982 have indicated an available flow of between 1800 and 2000 Igpm at 20 psi. This conclusion is reached primarily on the basis of having a reliable residual pressure measurement.

   It is now understood that often residual pressures have been taken from the remaining spigot on the hydrant being flow tested. This reading can be used to check the reading indicated by the pitot guage however, it should not be misconstrued as to mean an indication of residual pressure. Residual pressure readings should, if possible, be taken from the nearest hydrant upstream of the hydrant being flow tested. It is also believed that the very poor flow test results on other hydrants in the area are not due only to mains of extremely poor condition but are dependant, to a large degree, on inoperable and presumed closed valves.

2. We recommend that all valves in the downtown core area be operated to determine their condition and that a program be implemented to replace those valves found inoperable.

3. To provide adequate fire protection to the proposed Nursing Home development on Randal Street, we recommend that, as previously proposed in our letter of 82 01 12, a 200 mm diameter watermain be built on Reynolds Street to replace the 100 mm main presently in place and that a new 200 mm main be built on Sumner Avenue to the rear of the proposed development and tied into the existing system.

We have included the hydrant flow testing procedure recommended by the Canadian Underwriters Association. If the layout of the water system permits, this is the best method of testing hydrants for fire flow. We believe the Oakville Fire Department would find this a useful guide when conducting flow tests.

We trust the above meets with your approval. If however, you have any questions, please feel free to contact us, at your convenience.

Yours very truly,

SIMCOE ENGINEERING LIMITED

R. L. Smith, P. Eng.

RLS:mc
Enc.

HERALD AVE

WESTSIDE DR

DEANE AVE

QUEEN MARY DR.

RIVERSIDE DR.

MAURICE DR

FELAN AVE

KERR ST

BOND ST

HEAD ST.

REBECCA ST.

JOHN ST.

BROCK ST

WATER ST.

NAVY ST.

THOMAS ST.

LAKESHORE ROAD

D.C.

A.C.

150 mm

300 mm

500 mm

900 mm

100 mm

200 mm

700 mm

RSIDE DR

SIXTEEN MILE CREEK

WATER ST.

ROAD

D.C.

2"

2"

150 mm

300mm

NAVY ST. 700mm

150mm

THOMAS ST

150mm

GEORGE ST

200 mm

DUNN ST

100mm

100mm

200 mm

3/4"

2"

3/4"

200mm

150 mm

TRAFALGAR RD

150 mm

CHURCH ST.

100mm

150mm

150 mm

PALMER AVE

REYNOLDS ST.

SUMNER AVE

900mm

150 mm

DOUGLAS AVE.

WATSON AVE.

300 mm

GLOUCESTER AVE.

100mm

ALLAN ST.

RANDAL ST.

300mm

300mm

150 mm

100mm

200mm

1 1/2"

3/4"

150 mm

MH

100mm

150mm

ST.

150 mm

300 mm

300 mm

100 mm

LEGEND

- HYDRANT
- HYDRANT WITH VALVE
- VALVE
- VALVE CHAMBER
- AC — ACCESS CHAMBER
- PLUG
- DC — DRAIN CHAMBER
- ----- AUXILLARY WATERMAIN
- ——— WATERMAINS
- BO — BLOW OFF
- MH — MANHOLE

PALMER AVE
SUMNER AVE
RANDAL ST.
CHURCH ST.
LAKESHORE ROAD EAST
MICHAEL TERR.
REYNOLDS ST.
TRAFALGAR RD.
ALLAN ST.
DOUGLAS AVE.
WATSON AVE.
GLOUCESTER AVE.
BALSAM DR.
MH
150mm
100mm
200mm
300mm
900mm
1½"
¾"

HERALD AVE

WESTSIDE DR

DEANE AVE

MAURICE Dr

QUEEN MARY DR

RIVERSIDE DR

BUND ST

HEAD ST

HEBECCA ST

JOHN ST

BROCK ST

WATER ST

NAVY ST

THOMAS ST

LAKESHORE ROAD

900 mm
500 mm
300 mm
200 mm
150 mm
100 mm
50 mm

RIVERSIDE DR

QUEEN MARY DR

SIXTEEN MILE CREEK

PALMER AVE

SUMNER AVE

RANDAL ST

CHURCH ST

LAKESHORE ROAD

WATER ST

NAVY ST

THOMAS ST

GEORGE ST

DUNN ST

TRAFALGAR RD

REYNOLDS ST

ALLAN ST

DOUGLAS AVE

WATSON AVE

MH

DC

500mm

300mm

200 mm

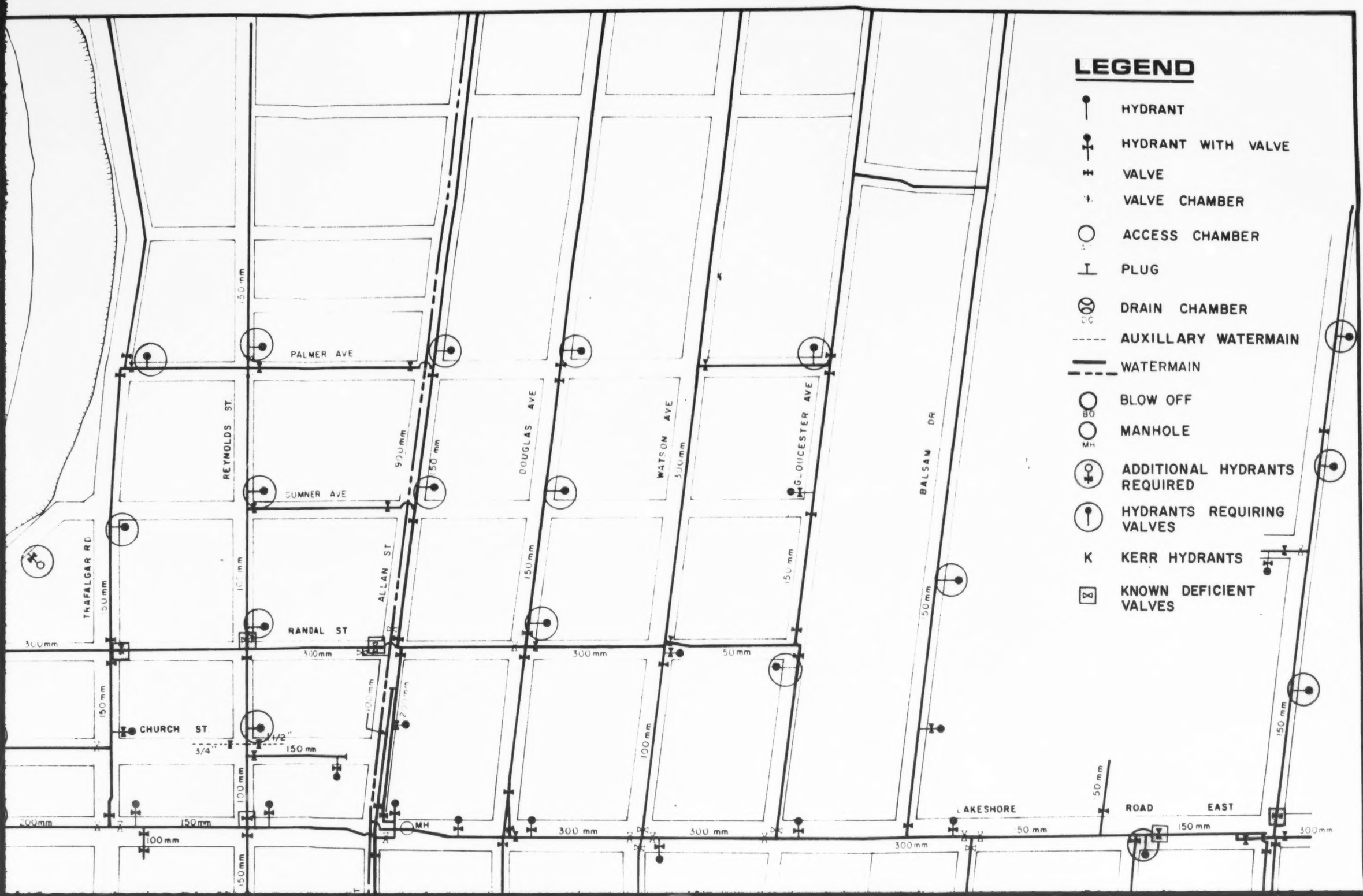
150 mm

100 mm

900mm

3/4"

1 1/2"


LEGEND
HYDRANT
HYDRANT WITH VALVE
VALVE
VALVE CHAMBER
ACCESS CHAMBER
PLUG
DRAIN CHAMBER
AUXILLARY WATERMAIN
WATERMAIN
BLOW OFF
MANHOLE
ADDITIONAL HYDRANTS REQUIRED
HYDRANTS REQUIRING VALVES
K KERR HYDRANTS
KNOWN DEFICIENT VALVES
PALMER AVE
SUMNER AVE
RANDAL ST
CHURCH ST
LAKESHORE ROAD EAST
REYNOLDS ST
TRAFALGAR RD
ALLAN ST
DOUGLAS AVE
WATSON AVE
GLOUCESTER AVE
BALSAM DR
MH
150mm
300mm
100mm
50mm
900mm
1/2"
3/4"

LAKESHORE ROAD
BURNET ST.
BROOKFIELD CR.
BROOKFIELD RD
BRANT ST
KERR ST
WILSON ST
CHISHOLM ST.
FORSYTHE RD
BATH ST.
ANDERSON ST.
WALKER ST.
NAVY ST.
D.C.
A.C
B.O.
2"CU
3/4"(3)
LAKE ONTA

LAKESHORE ROAD

LAKE ONTARIO

NAVY ST.

FRONT ST.

ROBINSON ST.

WILLIAM ST.

KING ST.

ALLAN ST.

FIRST ST.

UNION ST

SECOND ST.

D.C.

B.Q.

A.C.

MH

200 mm

150 mm

100 mm

300 mm

900 mm

3/4"

1" GALV.

3/4"(3)

THE REGIONAL M
TOW

Simcoe

title: C
E

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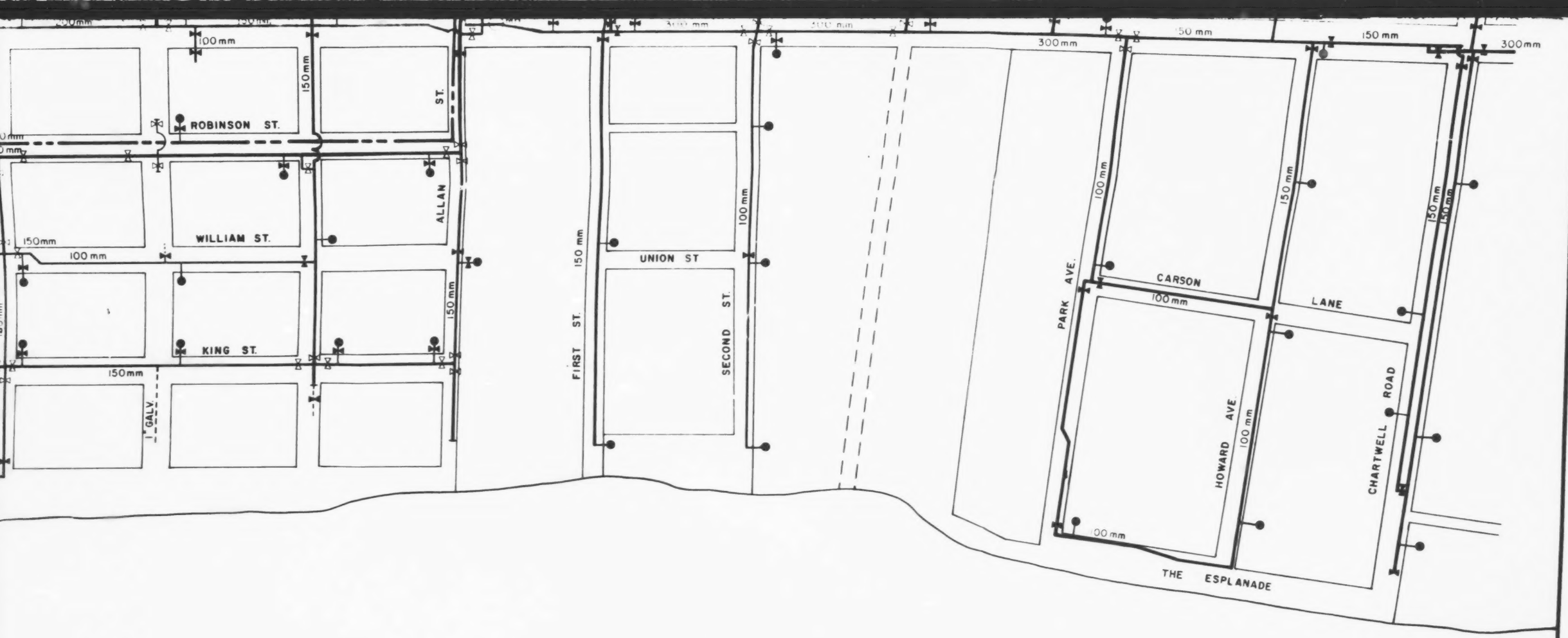
Consulting Engineers



THE REGIONAL MUNICIPALITY OF HALTON
TOWN OF OAKVILLE

Simcoe

title: CORE AREA STUDY
EXISTING SYSTEM

dwg: 1

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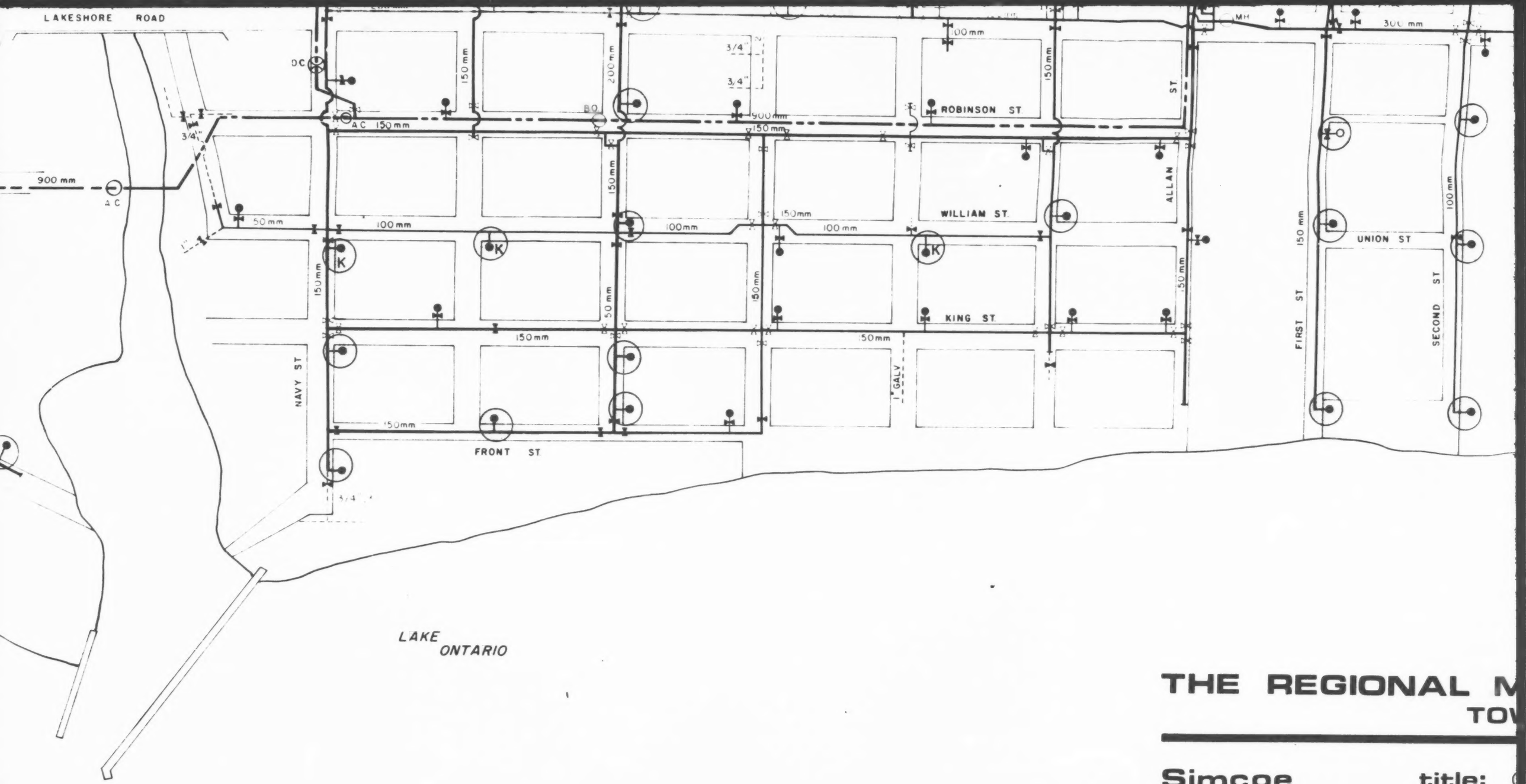
Consulting Engineers

0 50 150
SCALE IN METRES

BURNET ST.
BROOKFIELD CR.
BATH ST.
BRANT ST
KERR ST
WILSON ST
CHISHOLM ST
FORSYTHE RD
ANDERSON ST.
WALKER ST.
NAVY ST
BROOKFIELD RD
150 mm
900mm
750mm
300 mm
200mm
200 mm
100 mm
50 mm
AC
BO
DC
K
3/4"
2"CU
LAKE
ONTA



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TOV

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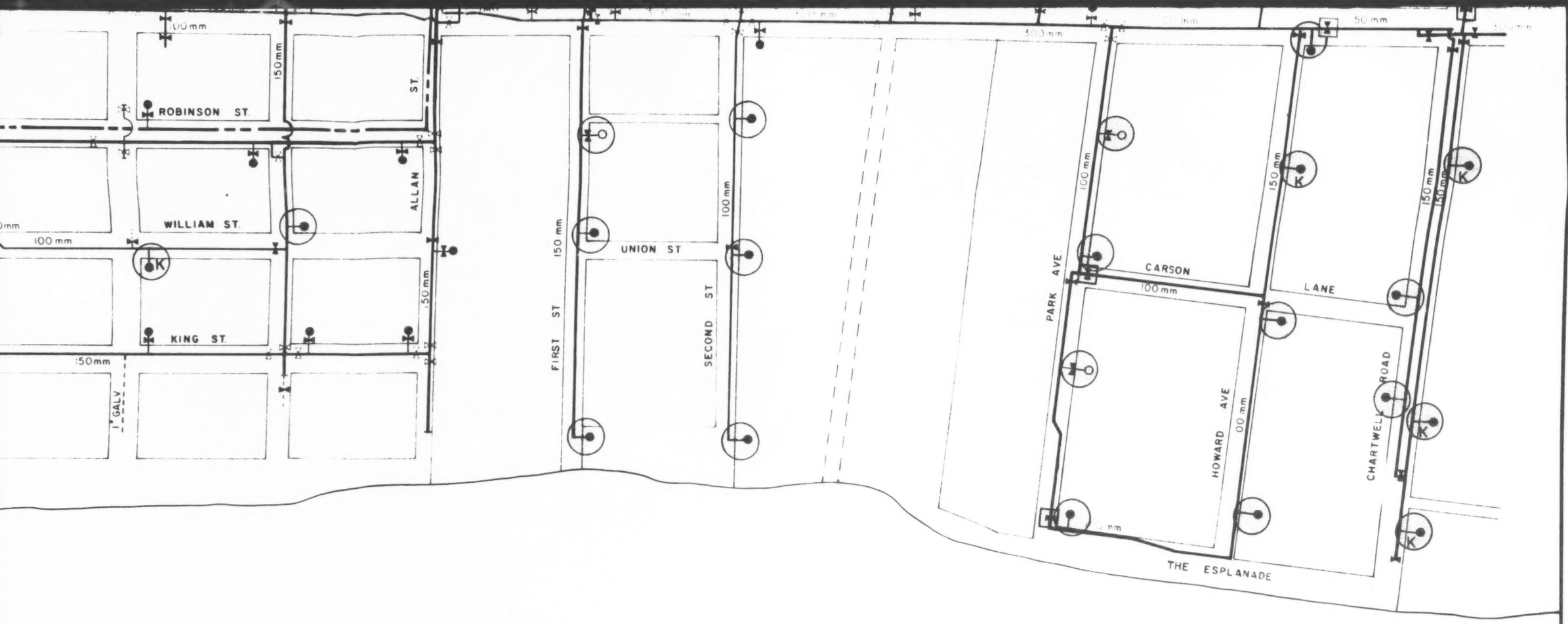
Consulting Engineers



THE REGIONAL MUNICIPALITY OF HALTON
TOWN OF OAKVILLE

Simcoe

title: CORE AREA STUDY
DEFICIENT VALVES & HYDRANT LOCATIONS

dwg: 2

0 50 150
SCALE IN METRES

Simcoe Engineering Limited
Consulting Engineers

HERALD AVE

DEANE AVE

MAURICE DR

QUEEN MARY DR

900 mm

RIVERSIDE DR

HEAD ST

REBECCA ST

JOHN ST

WATER ST

NAVY ST

THOMAS ST

LAKESHORE ROAD

300 mm

500 mm

150 mm

50 mm

100 mm

200 mm

150 mm abandon

SIXTEEN MILE CREEK

PALMER AVE

SUMNER AVE

RANDAL ST

CHURCH ST

REYNOLDS ST.

TRAFALGAR RD

ALLAN ST

DOUGLAS AVE

WATSON AVE

GLOUCESTER AVE

NAVY ST

THOMAS ST

GEORGE ST

DUNN ST

MH

150 mm

200 mm

300 mm

100 mm

700 mm

900 mm

3/4"

1 1/2"

LEGEND

- HYDRANT
- HYDRANT WITH VALVE
- VALVE
- VALVE CHAMBER
- ACCESS CHAMBER
- PLUG
- DRAIN CHAMBER
- AUXILLARY WATERMAIN
- WATERMAINS
- BLOW OFF
- MANHOLE
- PROPOSED WATERMAINS AND NEW VALVES
- PROPOSED CONNECTIONS TO TRUNK FEEDERMAINS

PALMER AVE
SUMNER AVE
RANDAL ST
CHURCH ST
LAKESHORE ROAD EAST
REYNOLDS ST.
TRAFALGAR RD
ALLAN ST
DOUGLAS AVE
WATSON AVE
GLOUCESTER AVE
BALSAM DR
MH
50 mm ABANDON
150 mm ABANDON

LAKESHORE ROAD

BURNET ST.

BROOKFIELD CR

BATH ST.

ANDERSON ST.

WALKER ST.

NAVY ST.

FRONT ST.

LAKE ONTARIO

ABANDON 200mm 300mm 900mm

SHORE ROAD

NAVY ST

FRONT ST

ROBINSON ST.

WILLIAM ST.

KING ST.

ALLAN ST

FIRST ST

SECOND ST

UNION ST

LAKE ONTARIO

200 mm

150mm

100 mm

300 mm

900mm

250 mm

50 mm

100mm

100 mm ABANDON

200mm

150 mm

3/4"

AC 150 mm

DC

BO

MH

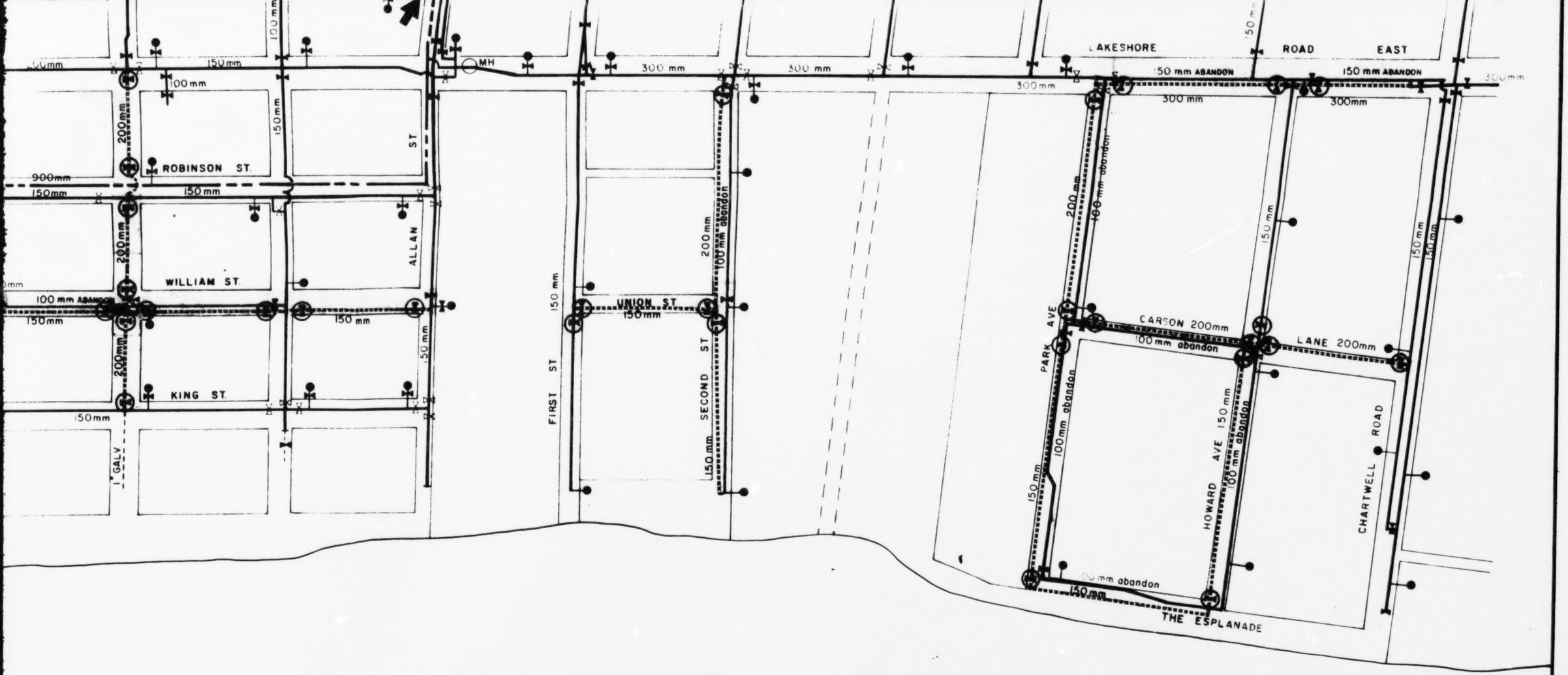
1" GALV

THE REGIONAL MUN
TOWN

Simcoe

title: CORE A
PROPOSE

Simcoe Engineering Limited
Consulting Engineers



THE REGIONAL MUNICIPALITY OF HALTON
TOWN OF OAKVILLE

Simcoe

title: CORE AREA STUDY
PROPOSED WATERMAINS

dwg: 3

0 50 150 SCALE IN METRES

Simcoe Engineering Limited
Consulting Engineers

POOR

QUALITY

ORIGINAL